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ABSTRACT

The feasibility of a partnership between educational institutions and data processing companies is explored. The purpose of a partnership would be to advance institutions technologically by utilizing the best resources of business and education. Attention is directed to a framework based upon a succession of paradigms for explaining stages of data processing. The initial paradigm is a single data processing operation and a single institution in one location. The final paradigm is a decentralized data processing operation networked to other institutions and joined to a corporation in a partnership. Variables (resources) that effect the movement from one stage to another are also considered: personnel, physical, financial, and institutional. Personnel variables include staff expertise, professional growth opportunity, attitudes, user satisfaction, and administrative support. The financial considerations include viability, commitment, and cost effectiveness, while the institutional/corporate concerns include leadership, priorities, perspective, and orientation. A framework for analysis is also included, based on assumptions concerning the strength of the educational institution and the strength of the company (SW)

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A NETWORK FOR THE FUTURE: FORMING A PARTNERSHIP BEYOND INSTITUTIONAL WALLS

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This paper will explore the feasibility of a partnership between educational institutions and data processing companies. The purpose of a partnership would be to advance institutions technologically by utilizing the best resources of business and education.

This paper explores those issues associated with a partnership approach. Four sets of issues are presented. The first is the impact upon the individual. The second pertains to hardware resources. The third set of issues pertains to financial resources. The final set pertains to institutional climate.

The paper will conclude with a list of criteria to assist institutions to analyze their potential for forming a partnership and thereby building a network for the future.

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> "We cannot wait for the world to turn, for times to change that we might change with them, for the revolution to come and carry us around in its new course ... We ourselves are the future."[1]
>
> Beatrice Bruteau

Introduction

The purpose of this paper is to present a network for the future. The focus will be on data processing in postsecondary education. Five sections comprise the paper: (1) conceptual framework, (2) variables, (3) analysis, (4) summary, and (5) conclusion. The paper should give the reader a framework to understand the change process; criteria to evaluate participants; and a projection of the future.

Conceptual Framework

Definitions

The term "paradigm" is from the Greek word paradigma, meaning pattern. It is a scheme for understanding and explaining certain aspects of reality. A paradigm is a framework of thought.

A paradigm shift is used to describe the evolutionary process. Shifts occur when too many puzzling observations pile up outside the framework of explanation and thereby strain it. A new insight is gained, usually at a point of crisis, to explain the apparent contradiction. It introduces a new principle that provides a new perspective.

Once the old has been reconciled with the new ideas, a new paradigm emerges. As explained in The Aquarian Conspiracy,

> "A new paradigm involves a principle that was present all along but unknown to us. It includes the old as a partial truth, one aspect of how things work, while allowing for things to work in other ways as well...it throws open doors and windows for new exploration."[2]

Application

A paradigm is now applied to data processing in educational institutions. It should be noted that the authors have taken liberty in using it in this manner. As a conceptual tool, however, its application appears to be appropriate as viewed by the authors. The paper describes a series of paradigms, each reflecting a given point in the evolution of data processing. Each successive paradigm is broader in scope and larger in number of participants than the previous ones. There is no intent to

present one as more effective than the other; the intent is to show how each serves a slightly different environment and corresponding need.

Paradigm One. The first paradigm is a single data processing center in a single building in an institution located on one site. The center performs all data processing for the institution and one director has sole responsibility. As the demand for increased services from users increases, a greater strain is placed upon this type of operation. A likely consequence is less satisfactory services and less contented users. The conditions ripen for a shift to paradigm two.

Paradigm Two. This paradigm is larger than the first, yet still is a single operation. The institution itself is also larger. The extent of data processing services is greater than in number one. Hardware upgrades have occurred and more staff have been added. While this operation serves the institution well for a period of time, demands for services begin to increase as new applications become available. Along with this increase may also come specialized interests. Institutional politics may play a role as competing priorities emerge and personal power and authority are sought within the organization. The data processing personnel can be caught in the middle in such circumstances. The result of these dynamics occurring is often a division in operations. It should be noted, however, that this division may have been brought about by factors other than those cited.

Paradigm Three. Once the whole is split into two equal parts, it becomes paradigm three. These two parts represent administrative data processing and instructional data processing. Both halves are as large individually as the whole of paradigm one. The larger size reflects increased services required of each in comparison to number two. The division into two parts indicates probable differences in organizational structure, hardware and software, and staff. Each of these two operations will generally service the institution for some time. The element of control and the need for greater responsiveness by the user, however, may surface. As less expensive, user friendly hardware and software become available, users begin to acquire their own capability, especially for small scale data processing needs. When this occurs, another paradigm evolves.

Paradigm Four. A multi-division pattern characterizes paradigm four. Many parts constitute the whole, a whole that is larger than paradigms one, two, and three, respectively. The configuration indicates that overall more data processing activities are occurring than in the previous paradigms. Also evident is the multiplicity of parts revealing a decentralized organizational structure, likely differences among the parts in hardware and software, and many participants involved in performing their own data processing. Pressure mounts, however, to increase the scope of all data processing activities. Another

strain occurs at the edges as the rigidity of the parts begins to detract from the communication among them. When this occurs, the door is open to paradigm five.

Paradigm Five. All previous paradigms were configured in squares or rectangles; the lines were straight, the corners perpendicular. Paradigm five shows a softening of these lines into rounded, curved edges. Such graphics illustrate less rigidity, and more fluidity in the decentralized data processing operations. While this configuration suffices for a period of time, users become aware of what other institutions and/or campuses are doing that could enhance what is being done in the original institution. Or, because of the need for rapid communication among institutions and/or campuses an electronic connection is sought. Paradigm six may result.

Paradigm Six. For the first time a second entity interconnects with the single entity heretofore described. This may represent an additional institutional location, another institution, or the beginnings of a consortia. It may be in response, for example, to the need for sharing scientific data, for sharing physical resources, and/or for administrative communication. Once the advantage of the communication becomes evident, the demand for more builds. Paradigm seven then emerges.

Paradigm Seven. At this point, the curved configuration with multiple parts has connected with three additional entities. As with the previous paradigm this one may entail more institutional locations, other institutions, and very likely consortial arrangements. Within this structure electronic communication is possible within the institution and among its various educational associates. This paradigm may suffice. However, two conditions may strain the paradigm. The first is that the institutions still "lack" something. It may be staff problems, such as inadequate quantity or expertise; hardware resources may be insufficient or out-of-date; and/or political factors detract from its effectiveness. The second set of conditions are those that occur when institutions are operating effectively but they want to do "more." They want state-of-the-art equipment, highly trained professionals, and they want to extend beyond the political arena. When these conditions occur, paradigm eight may come forth.

Paradigm Eight. The cumulative, multifaceted configuration extends in paradigm eight to greater numbers of participants and to one of a different nature. The new entity represents private enterprise. Though different in appearance, it interconnects in the same manner as the others and adds to the total configuration. It can bring to the configuration state-of-the-art equipment; sufficient power and capability; highly trained professionals, many of whom have been attracted away from education to industry by higher salaries, continuous training, and favorable working conditions; and business may bring an element of

objectivity to the configuration that minimizes politics and maximizes performance.

Paradigm eight is the concluding paradigm of the overall framework for this paper. An assumption will be made that paradigm eight represents the network of the future. Should this be the goal, the question then becomes, how can it be achieved. The method for determining "how" will be to identify and discuss what variables may exert influence in achieving that goal.

Variables

The variables are organized into four resource categories: (1) personnel, (2) physical, (3) financial, and (4) institutional. Within each category the variables are described as they pertain both to business and education. They also are discussed as they may be manifest positively or negatively.

Personnel

The personnel variables include staff expertise, professional growth opportunity, attitudes, user satisfaction, and administrative support.

Staff Expertise. Because of the technical base required and rapid changes in the data processing field, the number of professionals generally is limited in relation to demand. For any data processing operation to be successful, particularly one in a partnership, requires highly skilled and knowledgeable professionals. Without this resource, the partnership cannot be effectively attained. Private enterprise is increasingly in a position to attract the top professionals with higher salaries than education. Indeed, the strength of the business community in the partnership may be primarily in the expertise of its professionals. Education, however, may be more attractive to some professionals given its collegiate environment and lifestyle.

Professional Growth Opportunity. Perhaps in no other field is the need for continuous training more prevalent than in data processing. Without this training a staff may quickly lag behind in its knowledge and skills. Systems consequently suffer. The networking technology is one of the newer aspects and requires expertise in both development and maintenance. Educational institutions increasingly are restricting travel budgets as other expenses surpass travel as a priority. Businesses may also be inclined to expend less funds; however, given the accountability required by their contractual arrangement and prevailing competitive environment, there is pressure to provide highly trained professionals.

Attitudes. One of the most important factors in realizing a partnership is the attitude of the data processing professionals, especially the director. Within education, there is a tendency

on the part of data processing directors to view with suspicion external entities, especially private ones. Businesses also may have staff who do not hold in high esteem their counterparts within education. Either of these attitudes will seriously jeopardize achieving a partnership.

User Satisfaction. The degree of success of data processing operations, whether in education or business, is the level of satisfaction of their users. Within education, data processing users will seek other sources if not satisfied; in business, customers will switch to other companies or assume the job themselves. Users are the measurement of success and the tool of accountability.

Administrative Support. Both entities need support from the highest levels of authority. In education, the president must lend support attitudinally and fiscally to any joint venture. The chief executive officer of a company likewise must value and support with resources the management and staff who provide services to educational institutions. Both the president and chief executive officer also establish and emanate expectations, values, and standards of performance.

Physical

The second category of variables includes those related to hardware, scope of networking, and institutional configuration.

Hardware. The extent, type, and location of hardware are all considerations. Within an institution, the location of its hardware may be a reflection of the degree of receptivity to networking. An assumption is made that the more dispersed an institution's hardware, the greater the likelihood of networking and cooperative arrangements. For businesses a key factor is compatibility and experience with the institution's hardware.

Scope of Networking. Paradigms one through eight depict stages of data processing including the emergence of networking. If this framework is applicable, it is less likely that an institution described as paradigm one would immediately move to eight than would seven. The attitudes, organizational structure, and hardware configuration of seven make the transition to eight a slight approximation rather than a dramatic shift. And as most would acknowledge, dramatic shifts are difficult to absorb within an institution.

Institutional Configuration. The extent to which an institution has multiple locations may also be a consideration. It is likely that there will be more willingness to participate in an external network if there has been an internal network. Geographic isolation on the other hand may reinforce a somewhat parochial attitude, depending of course on the mission of the institution and its location. While the same may not be as true for businesses, there is the infusion of new ideas and people

that comes with multiple locations that may not be as extensive with a single location.

Financial

Three interrelated variables are financial: viability, commitment, and cost effectiveness.

Viability. Both education and business must examine these variables carefully. It is important that both be in a position of financial viability, for an institution to meet its obligations and for a company to continue to provide effective services. In recent years there have been both educational institutions and companies that have "gone under." For an educational institution, an examination of its budget, state level funding, capacity for tuition, and external funds is critical. For businesses, the profitability of the company, its market standing, and its rating all are indicators of viability.

Commitment. It is often stated that commitment is evident only if dollars are allocated. If so, educational institutions must review what proportion of the institution's budget is allocated to data processing. They must also look at the level of compensation allowed for data processing professionals. For businesses, it is important to know where the dollars are allocated to determine where the corporate philosophy is translated into action.

Cost Effectiveness. This variable may be one of the more critical ones for both education and industry. It may even be the one that leads to a cooperative venture. An institution must carefully analyze how its resources can be maximized and consider if the business community can do so better than the institution. A company has perhaps a stronger emphasis on this variable than an institution given the former's profit motive. It is incumbent on business to assure that the "effective" side of cost/effective is part of the arrangement.

Institutional/Corporate

Four variables will be discussed in this category: (1) leadership, (2) priorities, (3) perspective, and (4) orientation.

Leadership. While all the other variables are necessary, they are insufficient unless leadership is included. Leadership of an institution or a corporation instills an ideology that can foster or limit a partnership approach within a partnership. Without leadership neither will move forward and both will "watch" the future evolve.

Priorities. Information must be valued as a resource by an educational institution for it to compete with other resources. Once within the arena, its value in relation to other resources must be determined and supported. An institution must have

information as a high priority to effect a successful partnership.

Perspective. An institution or a corporation may choose whether to look out the window. The ones who do become more knowledgeable, more likely to change, and most probable to succeed. For it is looking out and away that one's view is extended and perspective broadened. Then a role can be determined.

Orientation. Once perspective has broadened, action must proceed. Those institutions and corporations positioned for action are those who will not wait for the world to turn; they are the ones carrying out a new course. The passive ones will wait for times to change.

This concludes the discussion of variables; the paper focuses now on analysis.

Analysis

Framework

The basis for analysis will be an analogy used to explain in simple terms the principle used in laser technology. It is titled in this paper "merging rings." As most are aware, when a pebble is dropped in a pool of water waves emanate out in the form of rings. When a second pebble is dropped in proximity to the first, their rings may meet. If the crest of one ring collides with the trough of the other pebble's ring, both rings are dissipated or diffused. If, however, the crest of one pebble's ring meets the crest of the second pebble's, the rings join into one stronger than the two. When this analogy is applied to education/business partnerships, the following assumptions result:

(1) When a weak company (trough) works with a strong institution (crest) both are impacted negatively (dissipate).
(2) When a weak institution (trough) works with a strong company (crest) both are impacted negatively (dissipate).
(3) When a strong institution (crest) works with a strong company (crest) both are strengthened.

Application

Based upon the last assumption, it appears that a partnership between a company and an institution within a networking environment will succeed if both are strong and will succeed to a greater extent than either alone. The other assumptions imply that success is unlikely if one of the two is weak. Should these assumptions be correct, what characteristics best describe the weak and strong or trough and crest?

Combination One

This combination is a strong institution and a weak company. The four categories of variables are used to describe the combination. Within personnel resources the characteristic that will make an institution strong in a partnership is a positive attitude to a partnership by data processing personnel. The variable that will most likely weaken a company will be lack of expertise.

Within physical resources an institution will probably be strong in the partnership if its hardware and facilities are in extended, dispersed locations. The physical resource that will likely most weaken a company is unreliability of hardware.

Financially, a strong institution will have a commitment to data processing; a weak company will have overexpenditures. Finally, the institutional resource most conducive to a partnership is leadership; for a company the factor that will weaken it most is mismanagement.

Combination Two

For an institution to be weak, the following characteristics likely are present: personnel - insecurity; physical - sole source; financial - minimal commitment; and institutional - lack of leadership. The strong company in contrast will have the following characteristics: personnel - expertise; physical - state-of-the-art equipment; financial - cost effectiveness; and institutional - effective management.

In combinations one and two it is evident that one negative variable can alter a positive variable. For example, if a company's staff has expertise but an institution's staff is insecure, it is unlikely that they can work together effectively. Or, if a company manages effectively but there is no direction from the leadership of the institution, neither will progress. Further, if an institution has a financial commitment but a company incurs cost overruns, a continuing commitment is in jeopardy. And as a last example, if an institution has leadership but a company mismanages, the institution's goal will not be achieved. But what could it be like when a strong company joins with a strong institution?

Combination Three

With this combination, visualize the results of the following strengths: (1) an institution's data processing staff have a secure, positive attitude and the company has a highly trained staff; (2) the institution has extended and decentralized its locus and the company provides state-of-the-art hardware/software capability; (3) the institution has a financial commitment to data processing and the company is cost effective in providing services; and (4) the institution has strong leadership and the

company is well managed. A network of the future, stronger than either could do alone, becomes a reality.

Summary

This paper has presented a framework based upon a succession of paradigms used to explain various stages of data processing. The initial paradigm was a single data processing operation and a single institution in one location. The final paradigm was a decentralized data processing operation networked to other institutions and joined to a corporation in a partnership.

Variables that effect the movement from one stage to another were discussed. They were categorized according to type of resources: personnel, physical, financial, and institutional.

Finally, a framework for analysis was presented and its resulting assumptions were applied to a partnership arrangement.

Conclusion

Several conclusions are set forth in this paper:

1. The data processing network of the future will include education/business partnerships.
2. Numerous factors must be considered when entering into a partnership.
3. The success of these partnerships is dependent upon the strength of the educational institution and the strength of the company.
4. The successful partnerships will achieve goals that exceed those of education alone.

Several observations should also be made at this point. First, the authors took many liberties in interpretation; stated generalizations not always applicable to individual situations; and set forth numerous assumptions. The intent, however, was not to present an empirically based study; rather, the intent was to "look out the window," so that vision is extended and perspective broadened. The methodology itself was based upon the use of a paradigm. If observations arose that contradicted or did not "fit within" the reader's paradigm or framework of thought, the reader will begin to experience paradigm shift. Once on his/her own, new insights will emerge and a new paradigm will crystalize that "includes the old as partial truth...while allowing things to work in new ways as well...it throws open doors and windows for new exploration."

Footnotes:

[1]Marilyn Ferguson, The Aquarian Conspiracy (Los Angeles: Tarcher, 1980) p. 26.

[2]Marilyn Ferguson, The Aquarian Conspiracy (Los Angeles: Tarcher, 1980) p. 27.